CLAIMS

1. Method for producing a crosslinkable elastomeric composition comprising:
   (a) at least one thermoplastic polymer selected from amorphous polymers having a glass transition temperature (T_g) higher than 80°C or crystalline polymers having a melting temperature (T_m) higher than 190°C;
   (b) at least one diene elastomeric polymer;
   said method comprising the following steps:
   - pre-mixing said thermoplastic polymer (a) with a portion of said diene elastomeric polymer (b) to obtain a masterbatch, said pre-mixing step being carried out at a temperature not lower than T_g or not lower than (T_m - 20°C);
   - mixing the masterbatch obtained in said pre-mixing step (1) to the remaining portion of said diene elastomeric polymer (b).
2. Method for producing a crosslinkable elastomeric composition according to claim 1, wherein the portion of the diene elastomeric polymer (b) used is from 20% by weight to 90% by weight with respect to the weight of the diene elastomeric polymer (b) present in the crosslinkable elastomeric composition.
3. Method for producing a crosslinkable elastomeric composition according to claim 2, wherein the portion of the diene elastomeric polymer (b) used is from 30% by weight to 50% by weight with respect to the weight of the diene elastomeric polymer (b) present in the crosslinkable elastomeric composition.
4. Method for producing a crosslinkable elastomeric composition according to any one of the

preceding claims, wherein the thermoplastic polymer (a) is present in the elastomeric composition in an amount of from 0.1 phr to 100 phr.

5. Method for producing a crosslinkable composition according to claim 4, wherein the thermoplastic polymer (a) is present in the elastomeric composition in an amount of from 3 phr to 60 phr.

6. Method for producing a crosslinkable composition according to claim 5, wherein the thermoplastic polymer (a) is present in the elastomeric composition in an amount of from 5 phr to 40 phr.

7. Method for producing a crosslinkable composition according to any one of the preceding claims, wherein the pre-mixing step comprises:

- feeding at least one thermoplastic polymer (a) into at least one extruder comprising a housing, at least one screw rotatably mounted in said housing including at least one feed opening and a discharge opening;
- mixing said at least one thermoplastic polymer (a) at a temperature not lower than T_g or not lower than (T_m - 20°C);
- feeding at least one diene elastomeric polymer (b);
- mixing said at least one diene elastomeric polymer (b);
- dispersing said at least one thermoplastic polymer (a) into said at least one diene elastomeric polymer (b) to obtain a masterbatch;
- extruding the obtained masterbatch through the discharge opening of said extruder.

8. Method for producing a crosslinkable composition according to claim 7, wherein the extruder is a co-rotating twin-screw extruder.

9. Method for producing a crosslinkable composition according to claim 7 or 8, wherein the masterbatch is obtained in the form of a continuous ribbon or in the form of a subdivided product.

10. Method for producing a crosslinkable composition according to any one of claims 7 to 9, wherein said at least one thermoplastic polymer (a) is dispersed in said masterbatch in the form of particles having an average diameter not higher than 20 μm.

11. Method for producing a crosslinkable composition according to claim 10, wherein said at least one thermoplastic polymer (a) is dispersed in said masterbatch in the form of particles having an average diameter of between 8 μm and 18 μm.

12. Method for producing a crosslinkable composition according to any one of the preceding claims, wherein the thermoplastic polymer (a) is selected from: cycloolefin polymers, poly(phenylene ethers), styrene-based polymers, polyesters, polyamides, polyimides, polycarbonates, polysulfones, polyvinylchlorides, polymethyl(meth)acrylates, polyacrilonitriles, polyvinylpyrrolidones, aromatic polyketones, poly(alkylene oxides), aromatic polysulphides, perfluorurated polyalkylenes, or mixtures thereof.

13. Method for producing a crosslinkable composition according to claim 12, wherein the thermoplastic polymer (a) is selected from: cycloolefin polymers, poly(phenylene ethers), styrene-based

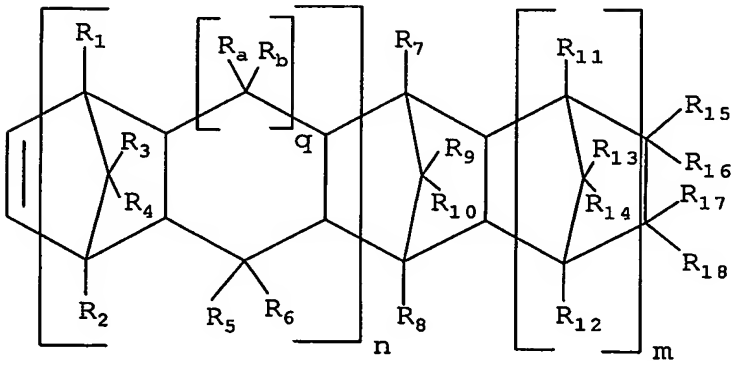
polymers, polyesters.

14. Method for producing a crosslinkable composition according to claim 13, wherein the cycloolefin polymer (b) is selected from:

(b-1) a cycloolefin random copolymer obtained by copolymerizing (i) at least one aliphatic α-olefin and (ii) at least one cycloolefin represented by the following formula (I) and, optionally, (iii) a polyene;

(b-2) a ring-opening polymer of at least one cycloolefin represented by the following formula (I); and

(b-3) a hydrogenation product of a ring-opening polymer of at least one cyclolefin represented by the following formula (I):



(I)

wherein:

- n is 0 or a positive integer;
- m is 0 or a positive integer;
- q is 0 or 1;
- R_1, R_2, R_3, R_4, R_5, R_6, R_7, R_8, R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, R_{17}, R_{18}, R_a ed R_b, which may be equal or different from each other, represent a hydrogen atom, a halogen atom, or an aliphatic, an alicyclic or an aromatic

hydrocarbon group;

- R_{15}, R_{16}, R_{17}, R_{18}, may be linked each other to form a monocyclic or polycyclic group which may have double bonds; and
- R_{15} and R_{16}, or R_{17} and R_{18}, may together form an alkylidene group.

15. Method for producing a crosslinkable composition according to claim 14, wherein in the cycloolefin random copolymer (b-1) the aliphatic α-olefin is an olefin of formula CH_2=CH-R, in which R represents a hydrogen atom, a linear or branched alkyl group containing from 1 to 12 carbon atoms.

16. Method for producing a crosslinkable composition according to claim 13, wherein the poly(phenylene ethers) (PPE) are selected from thermoplastic engineering resins obtained by the oxidative coupling polymerization of alkyl substituted phenols.

17. Method for producing a crosslinkable composition according to claim 16, wherein the thermoplastic engineering resins include poly(2,6-dialkyl-1,4-phenylene ethers).

18. Method for producing a crosslinkable composition according to claim 13, wherein the styrene-based polymers have atactic, syndiotactic or isotactic configuration.

19. Method for producing a crosslinkable composition according to claim 18, wherein the styrene-based polymers are: polystyrene, poly(alkylstyrene), poly(halogenated styrene), poly(halogenated alkylstyrene), poly(alkoxystyrene), poly(vinyl benzoate), hydrogenated polymer thereof, or mixtures thereof.

20. Method for producing a crosslinkable composition

according to claim 13, wherein the polyesters are selected from the polymer reaction products of at least one aliphathic or aromatic polycarboxylic acid ester of anhydride and at least a diol.

21. Method for producing a crosslinkable composition according to claim 20, wherein the polyesters are: poly(trans-1,4-cyclohexylene-(C_2-C_6)-alkane dicarboxylates; poly(cis- or trans-1,4-cyclohexanedimethylene)alkanedicarboxylates; poly-(C_2-C_4)-alkylene terephthalates; or mixtures thereof.

22. Method for producing a crosslinkable composition according to claim 12, wherein the thermoplastic polymer (a), either amorphous or crystalline, contains functional groups selected from: hydroxy groups, carboxylic groups, anhydride groups, ester groups, silane groups, epoxide groups.

23. Method for producing a crosslinkable composition according to any one of the preceding claims, wherein the diene elastomeric polymer (b) has a glass transition temperature (T_g) below 20°C.

24. Method for producing a crosslinkable composition according to claim 23, wherein the diene elastomeric polymer (b) is selected from: cis-1,4-polyisoprene, 3,4-polyisoprene, polybutadiene, optionally halogenated isoprene/isobutene copolymers, 1,3-butadiene/acrylonitrile copolymers, styrene/1,3-butadiene copolymers, styrene/isoprene/1,3-butadiene copolymers, styrene/1,3-butadiene/acrylonitrile copolymers, or mixtures thereof.

25. Method for producing a crosslinkable composition

according to any one of the preceding claims, wherein the elastomeric composition comprises at least one elastomeric polymer of one or more monoolefins with an olefinic comonomer or derivatives thereof (c).

26. Method for producing a crosslinkable composition according to claim 25, wherein the elastomeric polymer (c) is selected from: ethylene/propylene copolymers (EPR) or ethylene/propylene/diene copolymers (EPDM); polyisobutene; butyl rubbers; halobutyl rubbers; or mixtures thereof.

27. Method for producing a crosslinkable composition according to any one of the preceding claims, wherein at least one reinforcing -filler is present, in an amount of between 0.1 phr and 120 phr, in the elastomeric composition.

28. Method for producing a crosslinkable composition according to claim 27, wherein the reinforcing filler is carbon black.

29. Method for producing a crosslinkable composition according to claim 27, wherein the reinforcing filler is silica.

30. Elastomeric composition comprising:

- from 1% to 65% of at least one thermoplastic polymer (a), said thermoplastic polymer (a) being selected from amorphous polymers having a glass transition temperature (T_g) higher than 80°C or crystalline polymers having a melting temperature (T_m) higher than 190°C;
- from 35% to 99% of at least one diene elastomeric polymer (b);

wherein said at least one thermoplastic polymer (a) is dispersed in said elastomeric composition in the form of particles having an average

diameter not higher than 20 μm.

31. Elastomeric composition according to claim 30, comprising:
    - from 10% to 40% of at least one thermoplastic polymer (a), said thermoplastic polymer (a) being selected from amorphous polymers having a glass transition temperature (T_g) higher than 80°C or crystalline polymers having a melting temperature (T_m) higher than 190°C;
    - from 60% to 90% of at least one diene elastomeric polymer (b).
32. Elastomeric composition according to claim 30 or 31, wherein said at least one thermoplastic polymer (a) is dispersed in said elastomeric composition in the form of particles having an average diameter of between 8 μm and 18 μm.
33. Elastomeric composition according to any one of claims 30 to 32, wherein the thermoplastic polymer (a) is defined according to any one of claims 12 to 22.
34. Elastomeric composition according to any one of claims 30 to 33, wherein the diene elastomeric polymer (b) is defined according to claims 23 or 24.